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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,370	12/12/2003	John Frederick Ackerman	130013/11921 (21635-0116)	1818
31450	7590	07/11/2005	EXAMINER	
MCNEES WALLACE & NURICK LLC 100 PINE STREET P.O. BOX 1166 HARRISBURG, PA 17108-1166			BAREFORD, KATHERINE A	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,370

Applicant(s)

ACKERMAN ET AL.

Examiner

Katherine A. Bareford

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-11, 13-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 8 and 12 are canceled

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The amendment of June 3, 2005 has been received and entered. The Examiner notes that claims 8 and 12 have been canceled and claims 1-7, 9-11 and 13-17 are pending for examination.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Subramanian et al (US 6296945).

Claim 13: Subramanian teaches a method for preparing a protected article. Column 2, lines 20-40. The article is provided. Column 3, lines 50-68. A bond coat is deposited onto an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is formed on an exposed surface of the bond coat. Column 4, lines 50-65 and figure 2. To form the thermal barrier coating, first a primary ceramic coating is applied to an exposed surface of the bond coat. Column 2, lines 25-45. Then a sintering inhibiting material is applied to the surface of the primary ceramic coating. Column 2, lines 25-45, column 5, lines 30-65 and figures 2-3. The sintering inhibiting

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region can comprise cerium oxide in a concentration greater than a general cerium oxide concentration in the primary ceramic coating. Column 2, line 65 through column 3, line 10 and column 5, lines 30-50 (a cerium oxide material can be provided as component C and C is preferably not an A or B material of the primary ceramic). The resulting applied material can be C_zO_w , where $C=Ce$. Column 4, lines 55-65 and column 5, lines 35-45 (as z and w are not defined, it indicates that all possible cerium oxides can be used, including CeO_2 , which would provide Ce in the +4 oxidation state as claimed).

Claim 14: the article is a nickel base superalloy article. Column 3, lines 50-68.

Claim 15: the article is in the form of a component for a gas turbine engine.

Column 3, lines 50-68.

Claim 16: the step of depositing the bond coat includes depositing an aluminum containing overlay bond coat. Column 4, lines 5-20.

Claim 17: the primary ceramic coating can be yttria stabilized zirconia. Column 2, lines 40-50.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-7, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6296945) in view of Ueda et al (US 5697992).

Claim 1: Subramanian teaches a method for preparing a protected article.

Column 2, lines 20-40. The article is provided. Column 3, lines 50-68. A bond coat is deposited onto an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is formed on an exposed surface of the bond coat. Column 4, lines 50-65 and figure 2. To form the thermal barrier coating, first a primary ceramic coating is applied to an exposed surface of the bond coat. Column 2, lines 25-45. Then a cerium oxide compound can be applied to the surface of the primary ceramic coating.

Column 2, lines 25-45, column 4, lines 55-68, column 5, lines 30-65 and figures 2-3 (a

no cerium oxide material can be applied as component C of the C_zO_w). The cerium oxide precursor material can be infiltrated into the primary ceramic coating. Column 4, lines 55-68, column 5, lines 35-45 and figures 2-3 (note of the resulting C_zO_w material, component C can be Ce). The resulting applied material can be C_zO_w , where $C=Ce$.

Column 4, lines 55-65 and column 5, lines 35-45 (as z and w are not defined, it indicates

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that all possible cerium oxides can be used, including CeO_2 , which would provide Ce in the +4 oxidation state as claimed).

Claim 2: the article is a nickel base superalloy article. Column 3, lines 50-68.

Claim 3: the article is in the form of a component for a gas turbine engine.

Column 3, lines 50-68.

Claim 4: the step of depositing the bond coat includes depositing an aluminum containing overlay bond coat. Column 4, lines 5-20.

Claim 5: the primary ceramic coating can be yttria stabilized zirconia. Column 2, lines 40-50.

Claim 7: to provide the CeO material, a precursor for the material can be infiltrated into the exposed surface of the primary ceramic coating. Figures 2-3 and column 4, line 55 through column 5, line 5.

Claim 9: Subramanian teaches a method for preparing a protected article. Column 2, lines 20-40. A nickel base superalloy article that is a component in a gas turbine engine is provided. Column 3, lines 50-68. A bond coat is deposited on an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is provided on an exposed surface of the bond coat. Figure 2 and column 4, lines 50-65. To form the barrier coating, first a yttria stabilized zirconia primary ceramic coating is applied onto the exposed surface on the bond coat. Column 2, lines 25-45. Then a cerium oxide precursor material can be infiltrated into the primary ceramic coating. Column 4, lines 55-68, column 5, lines 35-45 and figures 2-3 (note of the

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resulting CzOw material, component C can be Ce). The resulting applied material can be CzOw, where C=Ce. Column 4, lines 55-65 and column 5, lines 35-45 (as z and w are not defined, it indicates that all possible cerium oxides can be used, including CeO₂, which would provide Ce in the +4 oxidation state as claimed).

Subramanian teaches all the features of these claims except that (1) the application of a non cerium oxide precursor and heating to form cerium oxide in a +4 oxidation state an oxygen containing atmosphere and (2) that the precursor is (NH₄)Ce(SO₄)₃ (ammonium cerium sulfate) (claims 6 and 11). Subramanian does teaches to infiltrate the material used to form the CzOw oxide (column 4, lines 55-68) and that this material can be applied as a liquid (column 4, lines 60-68, the sol-gel method).

VB However, Ueda teaches that ~~to provide~~ cerium oxide can be provided by providing a precursor of the oxide in liquid, and that a well known cerium compound precursor for this purpose that converts to cerium oxide by calcining is ammonium cerium sulfate. See column 4, lines 20-30. The calcining provides heating to perform the conversion. Column 4, lines 20-30 and 40-50. Heating methods include vacuum and non vacuum heating devices (which would provide heating in air). See column 4, lines 60-68.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Subramanian to apply the CzOw (cerium oxide) to the primary ceramic by applying a precursor in the form of ammonium cerium sulfate in

liquid and then heat in air to form the cerium oxide that will react with the primary ceramic as suggested by Ueda to provide a desirable coating system, because Subramanian teaches to infiltrate the material used to form the CeO_2 oxide (column 4, lines 55-68) and that this material can be applied as a liquid (column 4, lines 60-68, the sol-gel method), thus indicating that liquid precursor can be applied and heated to form the cerium oxide material that reacts, and Ueda teaches that it is known to apply a precursor compound of cerium oxide to a surface in the form of a liquid containing ammonium cerium sulfate and then heating/calcining in an air environment to form cerium oxide. This would further provide CeO_2 in the +4 oxidation state because of the use of ammonium cerium sulfate as the precursor material.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian in view of Ueda as applied to claims 1-7, 9 and 11 above, and further in view of Taylor et al (US 5520516).

Subramanian in view of Ueda teaches all the features of these claims except that the primary ceramic coating of yttria stabilized zirconia having about 7 percent yttria by weight.

However, Taylor teaches applying a yttria stabilized zirconia coat onto a bond coating on a gas turbine engine component. Column 5, lines 20-40. The zirconia coat is desirably 7 percent yttria by weight. Column 5, lines 20-40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Subramanian in view of Ueda to use yttria stabilized zirconia with 7 percent yttria by weight as the primary ceramic as suggested by Taylor to provide a desirable coating system, because Subramanian in view of Ueda teaches that yttria stabilized zirconia can be used on turbine components when forming thermal barrier coatings, and Taylor teaches that a desirable percentage of yttria in zirconia when coating yttria stabilized zirconia on turbine components is 7 percent by weight.

Response to Arguments

7. Applicant's arguments filed June 3, 2005 have been fully considered but they are not persuasive.

As to the 35 USC 102(b) rejection using Subramanian (claims 13-17), applicant argues that in Subramanian, "precursor" refers to a cerium-oxygen compound that is reacted with another oxide to form a reaction product, not the precursor to the oxide that is presently claimed. Furthermore, as to claim 13, applicant argues that there is no disclosure that the cerium is in the +4 oxidation state. According to applicant, Subramanian teaches $CzOw$ compounds as precursors of another reaction, without defining z and w . Applicant further states that the selection of a +4 oxidation state is not a matter of design choice, since no choice is presented.

The Examiner has reviewed these arguments, however, the rejection is maintained. In claim 13 as to the use of cerium oxide, all that is required is that the

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cerium oxide be on the surface at some point. There is no limitation that a later reaction cannot occur. Thus, the initial application of a material (CzOw) that can be cerium oxide to the primary ceramic as provided by Subramanian reads on the application of "cerium oxide" as claimed in claim 13. The only remaining issue is whether Subramanian teaches the use of cerium in a +4 oxidation state when providing this initial material (i.e. CeO₂). Since Subramanian puts no limits on z and w, it would indicate that all possible numbers for z and w are present, which would include z as 1 and w as 2, thus providing CeO₂. As a result, the claimed +4 oxidation state would be included among the possibilities of Subramanian.

As to the 35 USC 103 rejection using Subramain in view of Ueda (claims 1-7,9 and 11) applicant argues the issues with regard to the 35 USC 102(b) rejection above apply. Furthermore, applicant argues that Subramanian further does not provide the use of the cerium oxide precursor that is not cerium oxide with cerium in the +4 oxidation state and the heating to provide the cerium oxide with the +4 oxidation state as required by the claims. With regard to Ueda, applicant also argues that teaching is not relevant to Subramanian as ^{Subramanian} ~~it~~ never teaches converting anything to cerium oxide, but in fact starts with a cerium-oxygen compound in the form of CzOw.

The Examiner has reviewed these arguments, however, the rejection is maintained. As to the arguments with regard to the 35 USC 102(b) rejection, they do not overcome the rejection for the reasons discussed in that section. As to the argument that the use of the cerium oxide precursor that is not cerium oxide with cerium in the

+4 oxidation state and the heating to provide the cerium oxide with the +4 oxidation state is not suggested and that Ueda does not apply, the Examiner disagrees. As discussed in Subramanian at column 4, lines 55-68, the initial CzOw overlay material has to initially be applied to the primary ceramic columnar grain structure.

Subramanian teaches that it can be deposited by processes with allow for its deposition on top of the columns and also its infiltration between columns, such as by CVD or "a sol-gel technique". Thus, Subramanian teaches that the CzOw material has to be applied initially in some method that allows for infiltration and application, and that method can be a liquid application method. The Examiner has further cited Ueda as providing a liquid material that can be used to form a CzOw material (cerium oxide) using a precursor such as ammonium cerium sulfate which is heated to provide the cerium oxide. Thus, to one of ordinary skill in the art, it would have been obvious to use a liquid as taught by Ueda to perform the application of the cerium oxide material to the columnar ceramic of Subramanian, because it teaches a desirable liquid method for getting cerium oxide. As ammonium cerium sulfate is used and heated, CeO_2 will be formed (providing Ce in the +4 oxidation state).

As to the 35 USC 103 rejection further using Taylor, applicant argues that this claim is allowable for the reasons of parent claim 9. The Examiner has reviewed this argument, however, the rejection is maintained since the rejection of claim 9 is maintained as discussed above.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

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Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KATHERINE BAREFORD
PRIMARY EXAMINER